What is claimed is:

1. An apparatus capable of sensing pressure comprising:

a support structure; and

a sensor disposed on the support structure, the sensor including:

a ferromagnetic biasing layer;

a nonmagnetic conducting layer disposed on the ferromagnetic biasing layer; and

a magnetoresistive layer, wherein the magnetoresistive layer has non-zero magnetostriction such that the resistance of the magnetoresistive layer will change upon the application of pressure.

2. An apparatus according to claim 1 wherein the support structure is a deformable beam.

3. An apparatus according to claim 2 wherein the deformable beam is formed of semiconductor or insulator layers.

4. An apparatus according to claim 2 wherein the deformable beam is formed of a conductor.

5. An apparatus according to claim 2 wherein the deformable beam has a length of between 2 microns to several hundred microns.

6 An apparatus according to claim 5 wherein the deformable beam has a thickness ranging from 0.1 micron to 20 microns.

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7 An apparatus according to claim 6 wherein the width of the beam ranges from ~~2~~ 1 microns to several microns

Sub D1

8. An apparatus according to claim 1 wherein the support structure is a membrane.

9. An apparatus according to claim 1 wherein the support structure is formed within a cavity.

10. An apparatus according to claim 1 wherein the sensor has a length of 1 to several hundred microns.

11. An apparatus according to claim 1 wherein the nonmagnetic conducting layer includes tantalum.

12. An apparatus according to claim 11 wherein the biasing layer includes one of an alloy of Ni-Fe-Cr, and a laminated layer of CoTaZr and NiFeCr.

13. An apparatus according to claim 12 wherein the magnetoresistive layer includes a nickel alloy.

14. An apparatus according to claim 1 wherein the biasing layer includes one of an alloy of Ni-Fe-Cr, and a laminated layer of CoTaZr and NiFeCr.

15. An apparatus according to claim 14 wherein the magnetoresistive layer includes a nickel

alloy.

16. An apparatus according to claim 1 wherein the magnetoresistive layer includes a nickel alloy.

17. An apparatus according to claim 1 wherein the thickness of each of the ferromagnetic biasing layer, the nonmagnetic conductive layer and the magnetoresistive layer are within the range of 0.001µm – 0.5 µm.

18. An apparatus according to claim 1 further including an insulating layer disposed over the magnetoresistive layer and a conductive layer disposed over the insulating layer such that the conductive layer provides for protection from electrostatic discharge.

19. An apparatus according to claim 1 further including an underlayer disposed between the support structure and the ferromagnetic biasing layer.

20. An apparatus according to claim 10 wherein the underlayer comprises one of Tantalum and a composite of tantalum and Ni48Fe12Cr40.

21. An apparatus capable of sensing pressure comprising:

a substrate; and

a plurality of sensor devices disposed on the substrate in an array, each of the sensor devices

including:

a support structure; and

a sensor disposed on the support structure, the sensor including:

a ferromagnetic biasing layer;

a nonmagnetic conducting layer disposed on the ferromagnetic biasing layer; and

a magnetoresistive layer, wherein the magnetoresistive layer has non-zero magnetostriction such that the resistance of the magnetoresistive layer will change upon the application of pressure.

22. An apparatus according to claim 21 wherein each of the support structures is a deformable beam.

23 An apparatus according to claim 22 wherein each of the deformable beams is formed of semiconductor or insulator layers.

24. An apparatus according to claim 22 wherein each of the deformable beams is formed of a conductor.

25. An apparatus according to claim 22 wherein each of the deformable beams has a length of between 2 microns to several hundred microns.

26. An apparatus according to claim 25 wherein each of the deformable beams has a thickness

Sub D1

ranging from 0.1 micron to 20 microns.

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~~27. An apparatus according to claim 26 wherein the width of each of the beams ranges from 1 microns to several microns~~

28. An apparatus according to claim 21 wherein the support structure is a membrane.

29. An apparatus according to claim 21 wherein each of the support structures is formed within a cavity.

30. An apparatus according to claim 21 wherein each sensor has a length of 1 micron to several hundred microns.

31. An apparatus according to claim 21 wherein each of the nonmagnetic conducting layers includes tantalum.

32. An apparatus according to claim 31 wherein each of the biasing layers includes one of an alloy of Ni-Fe-Cr, and a laminated layer of CoTaZr and NiFeCr.

33. An apparatus according to claim 32 wherein each of the magnetoresistive layers includes a nickel alloy.

34. An apparatus according to claim 21 wherein each of the biasing layers includes one of an

alloy of Ni-Fe-Cr, and a laminated layer of CoTaZr and NiFeCr.

35. An apparatus according to claim 34 wherein each of the magnetoresistive layers includes a nickel alloy.

36. An apparatus according to claim 21 wherein each of the magnetoresistive layers includes a nickel alloy.

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37. An apparatus according to claim 21 wherein the thickness of each ferromagnetic biasing layer, each nonmagnetic conductive layer and each the magnetoresistive layer is within the range of 0.001 micron – 5 micron.

38. An apparatus according to claim 21 further including an insulating layer disposed over each magnetoresistive layer and a conductive layer disposed over each insulating layer such that each conductive layer provides for protection from electrostatic discharge.

39 An apparatus according to claim 21 further including an underlayer disposed between each support structure and the corresponding ferromagnetic biasing layer.

40. An apparatus according to claim 39 wherein the underlayer is one of Tantalum and a composite of tantalum and Ni48 Fe12Cr40

41. A method of sensing pressure in which applied pressure causes a change in the magnetization vector of a magnetoresistive layer within the device and a corresponding change in resistance comprising the steps of:

Sub a1

providing a sensing device with a sensor including plurality of layers, the plurality of layers comprising a non magnetic conducting layer disposed between a magnetoresistive layer with non-zero magnetostriction and a ferromagnetic biasing layer; and

sensing a resistance in the plurality of layers upon application of pressure to the sensing device, the applied pressure causing the magnetization vector of the magnetoresistive layer to change and thereby result in a change in resistance.

42. A method according to claim 41 wherein the sensing device includes a plurality of sensors that are formed and operate as the one sensor such that each sensor detects the pressure of an area associated with that sensor.

43. A method according to claim 41 further comprising the step of sensing an initial resistance of the device when the pressure to be sensed is not applied to the magnetoresistive layer.

44. A method according to claim 43 further comprising the step of determining the pressure applied to the sensing device, the step of determining using both the initial resistance and the sensed resistance in order to minimize the influence of external conditions on the determined pressure.

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45. A method according to claim 44 wherein the sensing device includes a plurality of sensors that are each formed and operate as the one sensor such that each sensor detects the pressure of an area associated with that sensor.

46. A method according to claim 45 wherein the method senses pressure applied during the obtaining of a fingerprint and further includes the step of using the resistance sensed by each sensor to determine the fingerprint.

47. An apparatus for sensing pressure comprising:

a substrate;

a sensor formed on the substrate, the sensor including:

a support structure that is smaller than the substrate, thereby providing a cavity above a portion of the substrate; and

a magnetoresistive sensor formed over the support structure.

48. An apparatus according to claim 47 wherein the magnetoresistive sensor is an AMR sensor.

49. An apparatus according to claim 47 wherein the magnetoresistive sensor is a GMR sensor.

50. An apparatus according to claim 47 wherein the support structure is a deformable beam.

51. An apparatus according to claim 50 wherein the deformable beam is formed of semiconductor or insulator layers.

52. An apparatus according to claim 50 wherein the deformable beam is formed of a conductor.

53. An apparatus according to claim 50 wherein the deformable beams has a length of between 2 microns to several hundred microns.

54. An apparatus according to claim 53 wherein the deformable beam has a thickness ranging from 0.1 micron to 20 microns.

55. An apparatus according to claim 54 wherein the width of the beam ranges from 1 microns to several microns

56. An apparatus according to claim 47 wherein a plurality of sensors arranged in an array are formed on the substrate, each of the plurality of sensors including:

a support structure that is smaller than the substrate, thereby providing a cavity above a portion of the substrate; and

a magnetoresistive sensor formed over the support structure.

57. An apparatus according to claim 56 wherein each magnetoresistive sensor is an AMR sensor.

58. An apparatus according to claim 56 wherein each magnetoresistive sensor is a GMR sensor.

59. An apparatus according to claim 56 wherein each of the support structures is a deformable beam.

60. An apparatus according to claim 59 wherein each magnetoresistive sensor is an AMR sensor.

61. An apparatus according to claim 59 wherein each magnetoresistive sensor is a GMR sensor.

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